

Age Composition and Growth of Incidental
Round Whitefish, (Prosopium cylindraceum)
In Assessment Gill Nets

by

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Introduction

The round or "menominee" whitefish, (Prosopium cylindraceum), is probably the third most common coregonid in Lake Michigan after chubs, (Coregonus hoyi) and lake whitefish, (Coregonus clupeaformis). Based on historic commercial catch data on lake whitefish the commercial harvest of menominee has been relatively minor in comparison. This status has probably contributed to the scarcity of published information on the biology of this species in the Great Lakes. The flesh of this species is very palatable when eaten fresh but freezing over any period of time decreases desirability thus making them less marketable.

Since the early seventies total catches have been as high as 84,000 pounds per year from the Wisconsin waters of Lake Michigan with most coming from the northern areas. Data on this species should be analyzed for proper management as it is now classified as a quota species by the Wisconsin DNR. To provide some of this information, menominee were sampled just prior to spawning by the Sturgeon Bay field office during whitefish and lake trout assessments in the fall of 1981-1986 and 1989 off the shores of Door County.

Materials and Methods

From 1981-1986 and in 1989 all menominee caught during lake trout and/or whitefish assessments were measured to the nearest mm and sexed. The entire sample consisted of 2947 menominee from assessment nets and an additional 37 from one monitored commercial lift. A subsample from each year had scale samples taken and from 1984-1986 subsamples were weighed to the nearest kilogram. Graded mesh gill nets were set and lifted from the RV Barney Devine at depths from 15-60 feet concentrating on spawning lake trout just south of the Sturgeon Bay canal off Salona Rd., Clay Banks and north at Whitefish Pt. (Fig.1). Spawning whitefish were assessed further north in the Jacksonport area.

Nylon gill nets were fished for lake trout in late October consisting of graded mesh panels of 2 1/2 to 6 inch stretched mesh in 1/2 inch increments from 1981-1986 (Table 1). Weather permitting, nets were lifted on a 24 hour basis. Graded mesh monofilament gill nets were used during whitefish assessment in 1982 and 1989. Larger meshes of 3 1/2 to 6 inch mesh in 1/2 inch panels of varying length were

used to catch spawning whitefish during the first two weeks of November.

In February 1984, a commercial menominee lift out of Algoma was monitored for incidental lake trout. All menominee were measured and scale sampled from 5000 feet of 2 3/4 and 2 5/8 inch nylon mesh gill net lifted after four nights in 60-72 feet of water.

All scale samples were taken from the area just above the lateral line near the base of the dorsal fin and all were read with a microfiche at 17mm power. Most scales were read three times for concurrence. No scales were regarded as unreadable. Weights were taken with an electronic digital platform scale. Mortality was computed using the least square regression method.

Results and Discussion

Age Composition

Twelve different age groups of fish were captured ranging from 2 to 13 years in this study (Table 2). Because of gear selectivity ages 1 and 2 were not fully vulnerable to our graded mesh nets. In 1989 older fish were predominant because smaller meshes were not fished (Tables 1 and 2). The 1978 and 1980 year classes appeared to be strong during these assessments. Mraz (1964) sampled menominee from a commercial lift from 2 1/2 to 2 5/8 mesh gill net set just north of the Sturgeon Bay Ship Canal in 1951 (Table 3). Mraz found six age classes compared to eight from our monitored commercial lift off Algoma from similar sized mesh. Mraz concludes that the predominance of age 4 over older fish probably reflects conditions in the stock, not gear selection. According to our graded mesh study, menominee are longer lived than Mraz speculates. Commercial fisherman in Wisconsin are allowed no larger than 2 3/4 inch stretch mesh for menominee thus they are probably most vulnerable from ages 4-7 with strong year classes having effect on age composition past this. Age 6 (1978 year class) was predominant in our commercial lift compared to age 4 in the Mraz study. Total annual mortality for the years of 1981 and 1983 combined was 33% for fish age 6 and older (Fig. 2).

Age and Growth

Length at age was similar in our assessments through the years (Table 4). This also held true comparing the monitored lift off Algoma to length at age from graded mesh assessments. However, in comparing this to Mraz he finds better growth rates in ages 5-8 although he also experienced difficulty in aging fish 6 years and older and his sample of larger fish was small. Outside annuli in our scales were hard to differentiate in many fish over 8 years of age.

Weight data from the years 1984-1986 were consistent (Table 5). The length-weight relationship for the years 1984 and 1986 respectively, were:

$$\text{Ln weight} = -19.79 + 3.21 \text{ Ln length}^2 \quad r = .92$$

and

$$\text{Ln weight} = -20.78 + 3.37 \text{ Ln length}^2 \quad r = .93$$

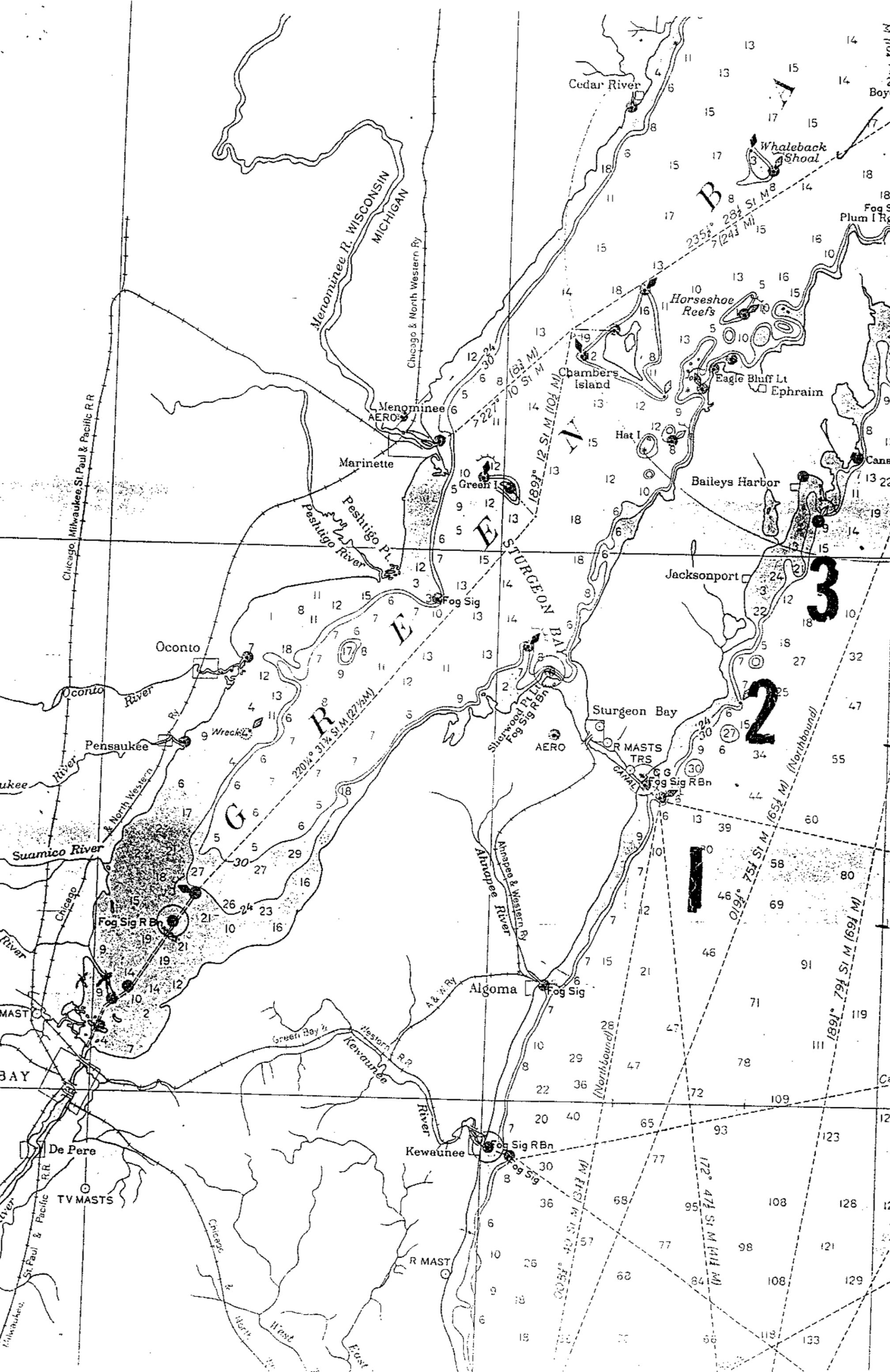
Commercial Harvest

Menominee harvest for the years 1981-1989 have been fairly consistent except for 1989 (Table 6; Fig. 3). The peak harvest was 84,406 lbs. in 1987. In 1989 only 6610 lbs. were landed. As of July 1, 1989 menominee have been on a quota fishery but this should not have caused a large decrease since the quota was 75,000 lbs. for July 1, 1989 through June 1990. A better explanation is that menominee are targeted by a few fisherman who harvest a majority of the catch or the market demand may have been low. Menominee are occasionally reported as lake whitefish but not to a large extent.

Literature Cited

Mraz, Donald. 1964. Age and growth of the round whitefish in Lake Michigan. Transactions of the American Fisheries Society, 93 (1): 46-52.

Figure 1. Locations where menominee were collected during lake trout assessment (Salona Rd. 1 and Whitefish Pt. 2) and during whitefish assessment (Jacksonport 3), from 1981-1986 and 1989.



Menominee R. WISCONSIN MICHIGAN

Cedar River

Whaleback Shoal

B

235° 28' SI M 8
7 24 15

Horseshoe Reefs

Chambers Island

Eagle Bluff Lt
Ephraim

Menominee AERO

Marinette

Peshtigo Pt. Light
Peshtigo River

Green I.

E
STURGEON BAY

Baileys Harbor

Jacksonport

3

Oconto

R
G

Sturgeon Bay

2

Pensaukee

Fog Sig R Bn

AERO

R MASTS TRS

Fog Sig R Bn

Suamico River

Alhappes River
Alhappes & Western Ry

Algoma

Fog Sig

De Pere

Kewaunee

Fog Sig R Bn

R MAST

TV MASTS

St. Paul & Pacific R.R.

Chicago & North Western Ry

Green Bay

Western R.R.

River

River

East

172° 47' SI M (41 M)

172° 47' SI M (41 M)

189° 79' SI M (69 M)

St. Paul & Pacific R.R.

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Green Bay

Western R.R.

River

River

East

172° 47' SI M (41 M)

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189° 79' SI M (69 M)

CATCH CURVE FOR MENOMINEE 1981 AND 1983 COMBINED

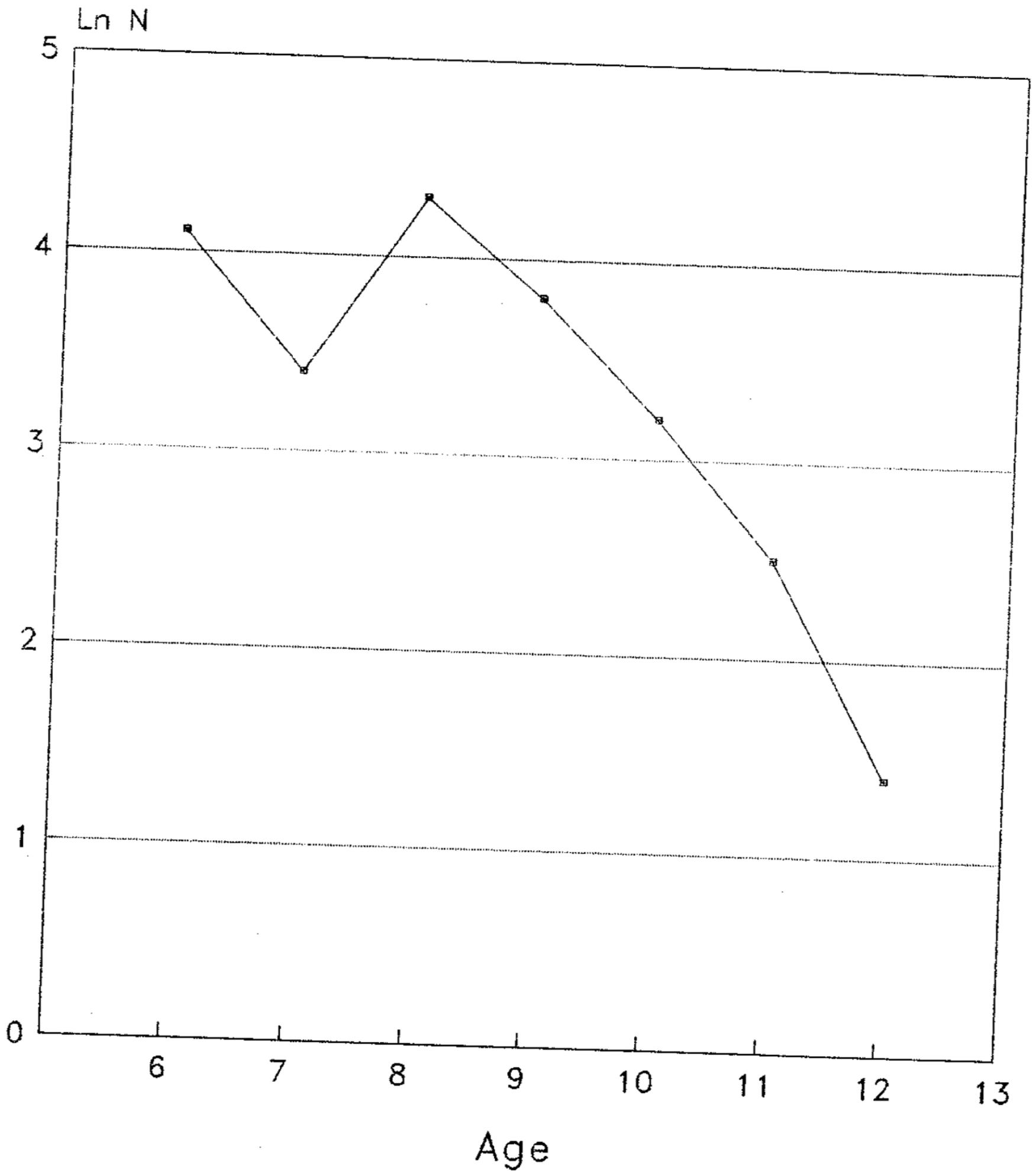


Figure 2. Catch curve for ages 6-12 combined for menominee in 1981 and 1983.

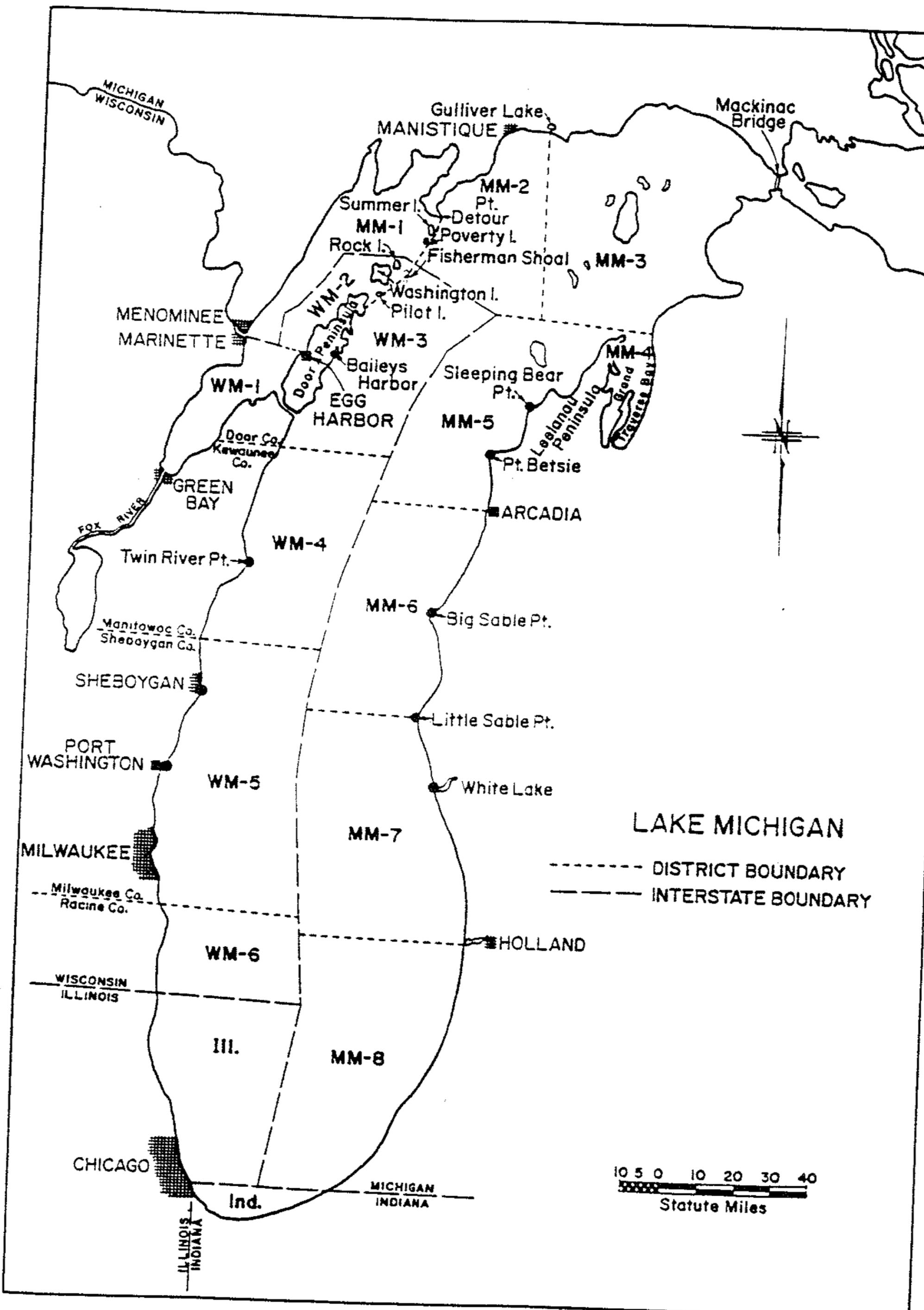


Figure 3. Breakdown of Lake Michigan by statistical district.

Table 1 Amount of gear lifted (ft.x100) during assessments by north-south* locations from 1981-1986 and 1989.

Loc. Year	N	Mesh Size								
		2.5	3	3.5	4	4.5	5	5.5	6	
So. 1981	135	24	24	24	24	24	24	24	24	24
So. 1982	116	14	14	14	14	14	14	14	14	14
No.**	63	-	-	-	-	18	6	6	6	6
Tot.	179	14	14	14	14	32	20	20	20	20
So. 1983	245	26	26	26	26	26	26	26	26	26
So. 1984	645	25	25	25	25	25	37	25	25	25
No.	256	8	8	8	8	8	8	8	8	8
Tot.	901	33	33	33	33	33	33	33	33	33
So. 1985	672	38	38	38	38	130	38	38	38	38
No.	20	10	10	10	10	10	10	10	10	10
Tot.	692	48	48	48	48	131	48	48	48	48
So. 1986	252	19	19	19	19	110	19	19	19	19
	257	16	16	16	16	36	16	16	16	16
Tot.	509	35	35	35	35	36	16	16	16	16
No.** 1989	308	-	-	18	36	36	36	18	-	-

*Nets fished south of the canal for lake trout, nets fished north of the canal for lake trout and whitefish.

**All mono

Table 2 Percent age composition of menominee caught in graded mesh gill net from Salona R. north to Jacksonport Oct-Nov., 1981-1986 and 1989.

Year	N	AGE											
		2	3	4	5	6	7	8	9	10	11	12	13
1981	135	-	6.4	7.3	9.2	24	4.4	26.2	11.6	6.6	3.6	.7	-
1982	179	.5	-	20.3	5.2	10.1	10.5	12.7	17	14.9	4.1	4.7	-
1983	245	-	15.1	4.5	21.3	12.2	9.4	16.3	11	6.1	2.9	1.2	-
1984	879	1.1	5.3	22.1	4.6	29.8	9.9	11.2	9.9	4.6	1	.5	-
1985	692	-	7.9	8.4	25.1	15.4	17.1	7.1	12.2	3.1	1.5	.6	1.6
1986	509	-	9.4	15.4	19.3	19.7	8.1	11	6.2	6	3.9	1	-
1989	308	-	.3	.9	2.7	10.2	17.5	29.2	25.2	10.7	3.3	-	-

Table 3 Average length (mm) at age (growing seasons) and percent age composition of monitored commercial lift in Feb. 1984 off Algoma from 2 3/4 and 2 5/8 inch mesh vs. Mraz (1951) monitored lift in Dec. 1951 off Sturgeon Bay from 2 1/2 - 2 7/8 inch mesh

Year	N	AGE							
		3	4	5	6	7	8	9	10
1984	37	326	371	392	418	430	447	451	488
%		8.1	18.9	5.4	29.7	10.8	18.9	5.4	2.7
1951	208	310	360	394	442	465	498	-	-
%		7.2	66.3	20.6	2.4	.5	3		

Table 4 Average length (mm) at age for menominee caught in graded mesh gill net from Salona Rd. north to Jacksonport Oct.-Nov., from 1981-1986 and 1989.

Year	N	AGE											
		2	3	4	5	6	7	8	9	10	11	12	13
1981	135	-	369	410	429	441	455	470	488	492	514	522	-
1982	120	312	-	398	422	440	455	473	487	504	508	526	-
1983	245	-	356	392	408	433	450	469	482	501	518	527	-
1984	156	317	360	380	410	424	457	472	488	494	511	515	-
1985	275	-	344	378	395	420	444	463	486	496	526	545	528
1986	174	-	358	376	403	425	442	469	479	498	505	513	-
1989	75	-	332	420	414	421	440	457	471	490	494	-	-
Mean	1180	314	353	393	412	429	449	468	483	496	511	525	528

Table 5 Average weight (kilograms) at age for menominee caught in graded mesh gill nets from Salona R. to Jacksonport Oct.-Nov., 1984-1986.

Year	N	AGE										
		3	4	5	6	7	8	9	10	11	12	13
1984	156	.39	.48	.6	.72	.92	.93	1.04	1.14	1.15	1.4	-
1985	223	.33	.45	.53	.59	.83	.96	1.03	1.06	1.3	1.4	1.4
1986	107	.39	.45	.55	.68	.78	.93	.93	1.22	1.18	1.33	-
Mean	486	.37	.46	.56	.66	.84	.94	1.11	1.14	1.21	1.38	1.4

Table 6 Total pounds of menominee caught from Wisconsin waters of Lake Michigan by statistical district.

Year	District					Year
	1	2	3	4	5	
1981		5228	29830	8254		43312
1982	1163	1923	41245	15505	7	59843
1983	489	843	36256	18219	525	55807
1984	1650	41765	15135	6828	432	65811
1985	87	14546	20584	3183	5790	44190
1986	7107	37104	8098	9914	3276	65499
1987	149	54831	2721	25372	1333	84406
1988	44	19672	23803	7694	1458	52671
1989						6610

Breakdown of poundage by district was unavailable for 1989.